

UPDATING ELECTRONIC CHARTS USING ADS-B BROADCAST SERVICES

Presented to
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INTENT

- Structure a global electronic data base update and distribution process centered on WGS 84 geo data that would be fully ICAO Annex 15 compliant.
- Initial Operational Objectives:
 - Provide graphical Temporary Flight Restriction (TFR) depictions to users
 - Ensure that “own-ship” moving map applications utilizing airport map databases do not provide false or misleading information.

OBJECTIVES

- To create a common information Internet-based network, providing data:
 - To any user
 - At any time
 - Anywhere

SCOPE

- Approach based upon the aircraft receiving timely database updates prior to departure along with in-flight updates using ADS-B broadcast services.
- Scope encompasses “permanent” and “temporary” changes IAW ICAO Annex 15.
- Terrain, obstacle and all charts included within scope.

“PRODUCT SCOPE” DEFINED

- Airport diagrams
- Departure procedures / SIDs
- IFR en route charts
- VFR charts
- Arrival procedures / STARs
- Precision approach charts
 - Includes RNP-based VNAV / LNAV approaches

PRODUCT SCOPE (Cont.)

- Non-precision approach charts
- Visual approach charts
- Noise abatement charts
- Engine-out procedures

ARCHITECTURE

- System-level architecture includes:
 - AIS / FIS ground server and interfaces
 - Aircraft systems

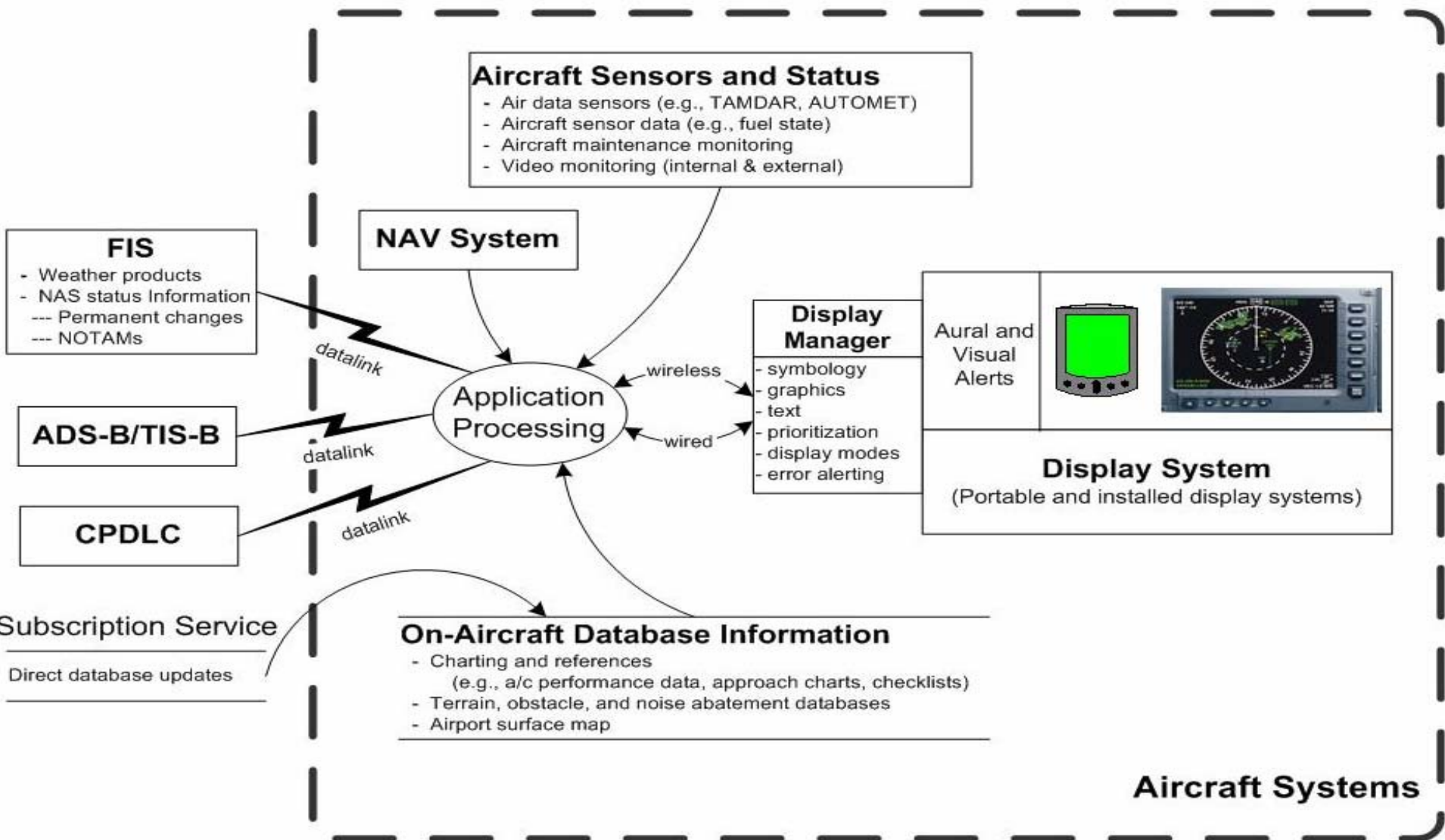
DATA SOURCES

- Concept based on data originator / source provider performing "Direct data entry" into an AIS / FIS server maintained by the FAA
 - Potential breakthrough if source providers could be certified and approved to provide and enter data on a continuous basis.
- Common formatting standards would result in uniform data allowing timely route-oriented database updates.

High-Level Architecture

- Create a new AIS / FIS ground server architecture
 - **Leverage on-going FAA initiatives**
- Allow Internet access by any qualified user during preflight planning process
- Provide for direct electronic database updates prior to pushback and prior to flight while operating on the airport surface
- Use ADS-B broadcast services (or other suitable RF links) to update onboard databases during flight

OVERVIEW



Data Sources for FIS/AIS

Annex 15 Compliant; Includes Aeronautical Charting, Navigation Databases and Terrain/Obstacle/Noise/Airport Map Databases.

Data Sources

Aeronautical and Flight Information Services (AIS/FIS)

National Flight Data Center (NFDC)
(e.g., TFRs, GPS outages, other NOTAMs)

FAA Charting (AVN)
(e.g., SIAPs, charts)

ATC System Command Center (ATCSCC)
(former "Central Flow Control") (e.g., ground delay programs, SWAP)

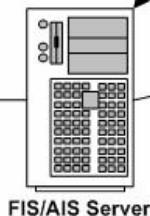
User Input Terminal
(e.g., airport status direct from apt ops, SNOWTAMs)

Military Airspace Management System
(e.g., SUA updates)

Dept. of Interior/Bureau of Land Management/
National Fire Center
(e.g., fire-fighting TFRs) *

Weather Products
(to include automated rapid-update surface observations, RVR trend data, etc.)

FIS/AIS Servers
Operated by other States



FIS/AIS Server

Distribution Network

Public Web Servers and other outlets
(including AFSS and DUATS).

GOALS

1. Make FIS/AIS data available to all users as soon as it is available for distribution.
2. Shrink the AIRAC cycle from 28 days to something less. (Updates referenced to effective date/time and with integrity levels required for intended function.) Make update cycle based on AIRAC+1.

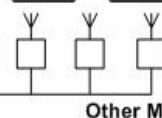
Need to harmonize existing commercial processes for updating FIS/AIS database content.

Aviation database updates prior to flight, i.e., CD-ROM, flash memory, floppy. Highest integrity needed for highest level applications. Temporal accuracy based on UTC.

Electronic Media



On-Ramp Wireless Media



Other Media



Cabin Service Provider

2-way Satellite Broadband (IP)



Commercial Broadcast

Satellite Broadcast Subnet



UAT Subnet

AIRAC Changes
(Database subscription provider.)



FMS

Application Processing



Display System

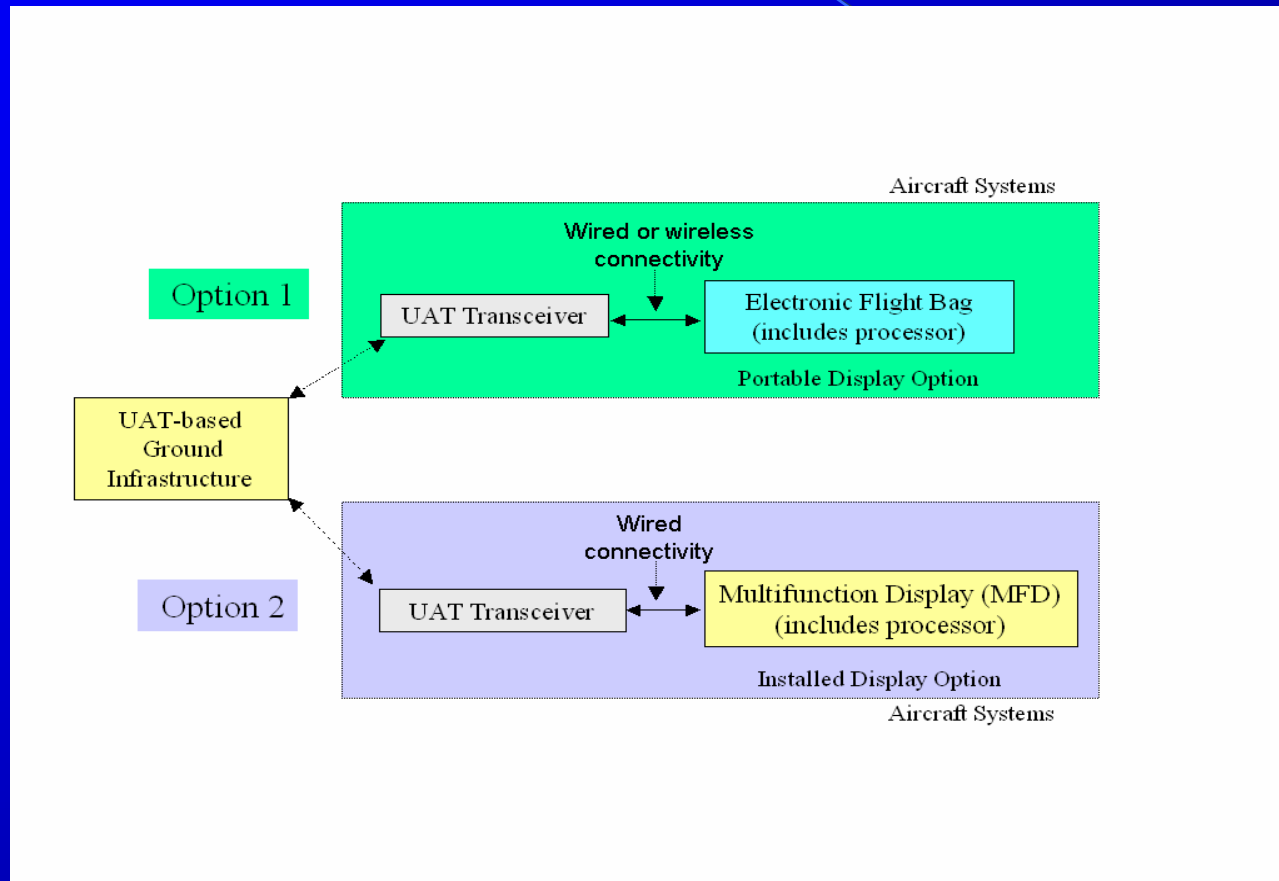
WX sensors

Aircraft Systems

Flight Information Services (FIS)

* See <http://airspace.blm.gov>

Simplified Example



View Select

Zoom- Zoom+

Display Mode

Range Ring

Incr Decr

☐ Vel Vec

☐ Compass

☐ NUC Env

☒ NOTAM

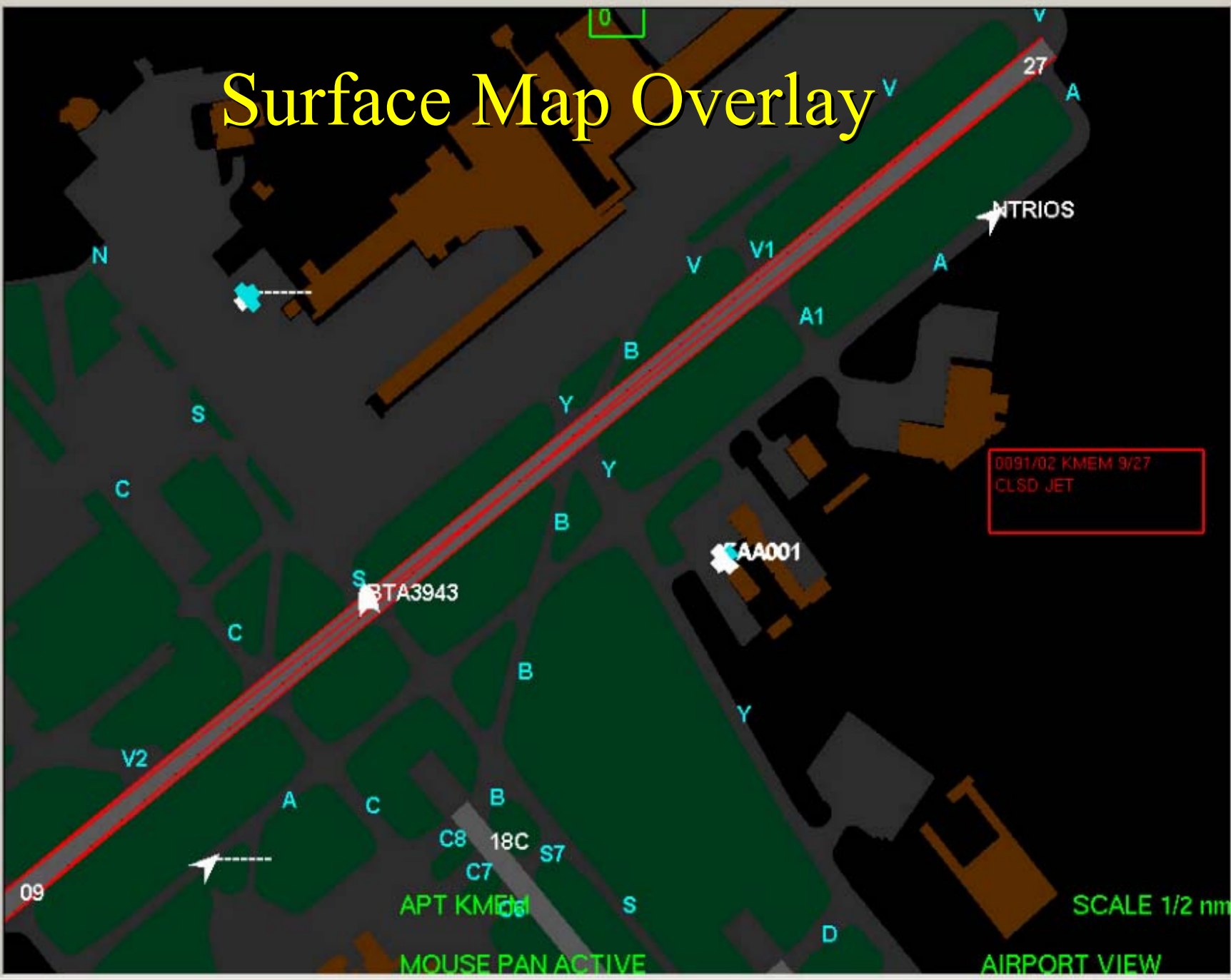
Traffic Info

Next Prev

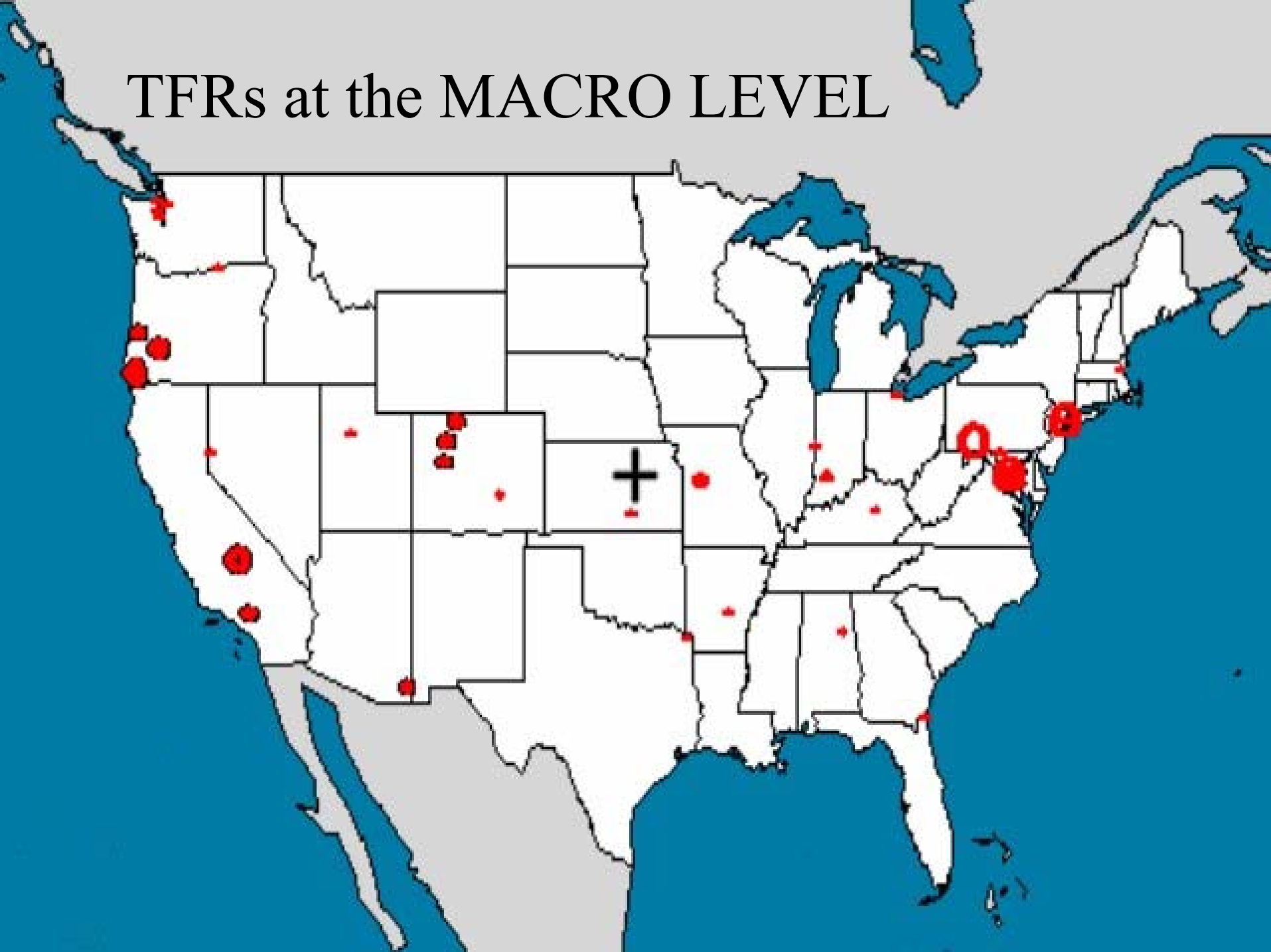
Hold

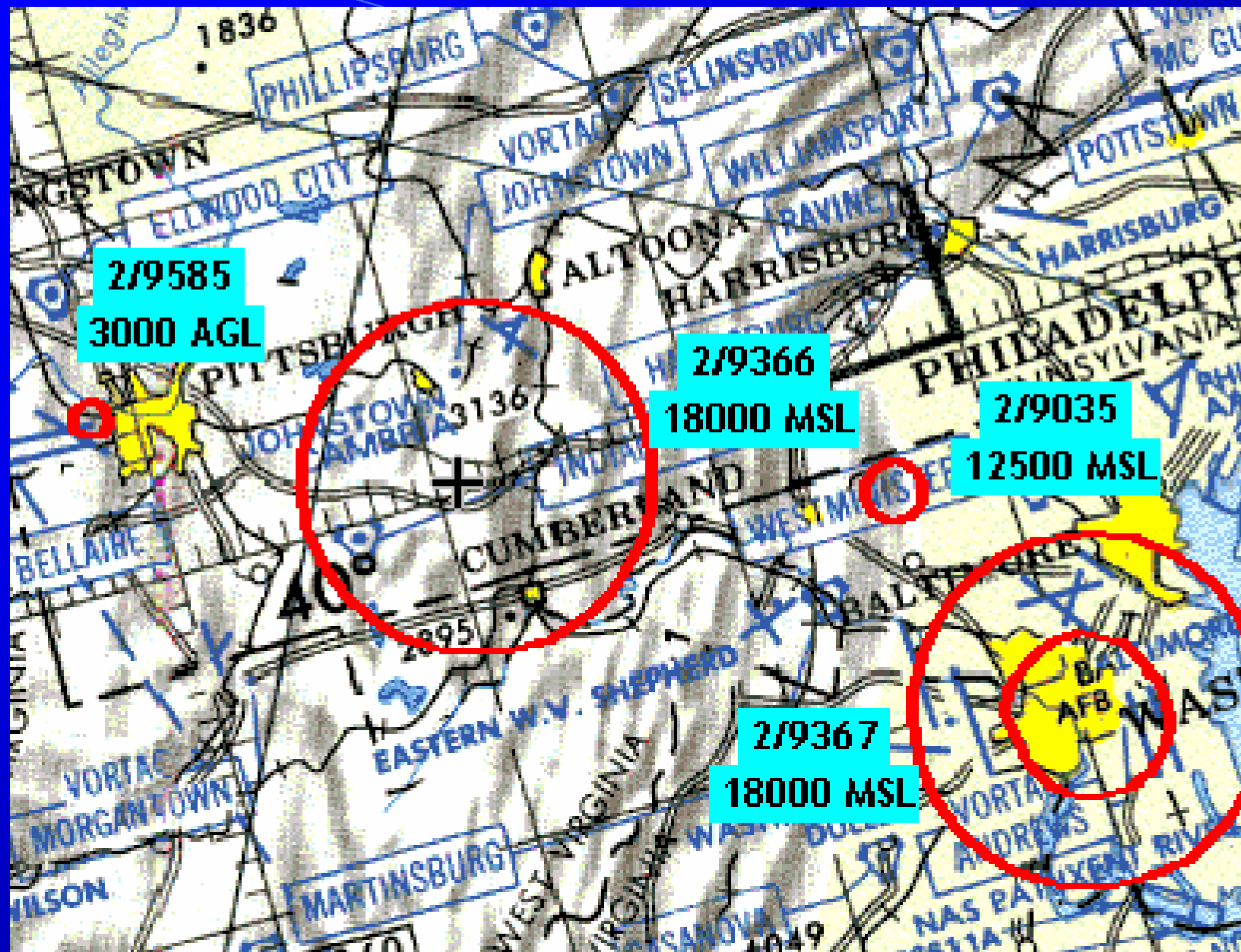
Declutter

Surface Map Overlay

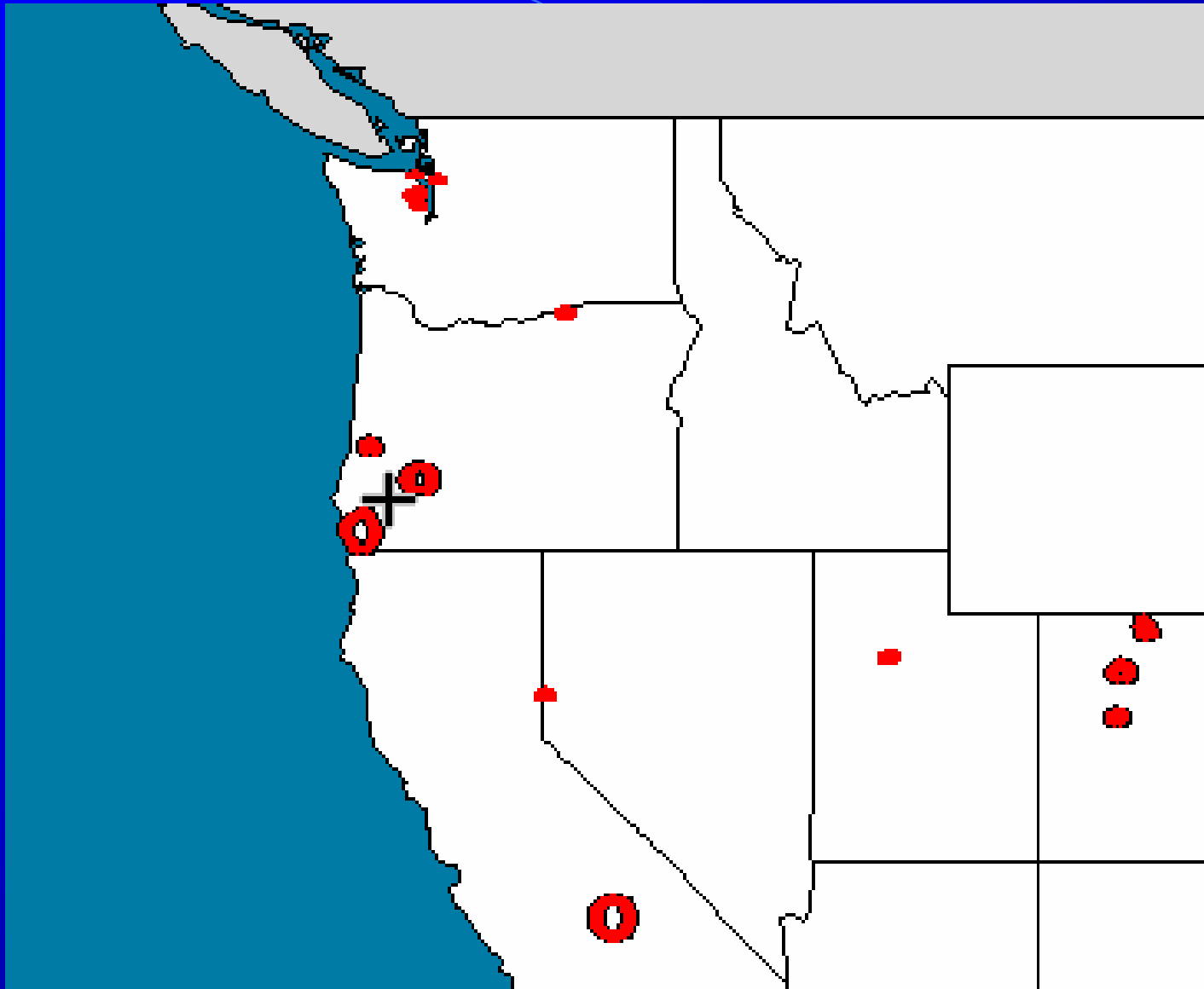


TFRs at the MACRO LEVEL

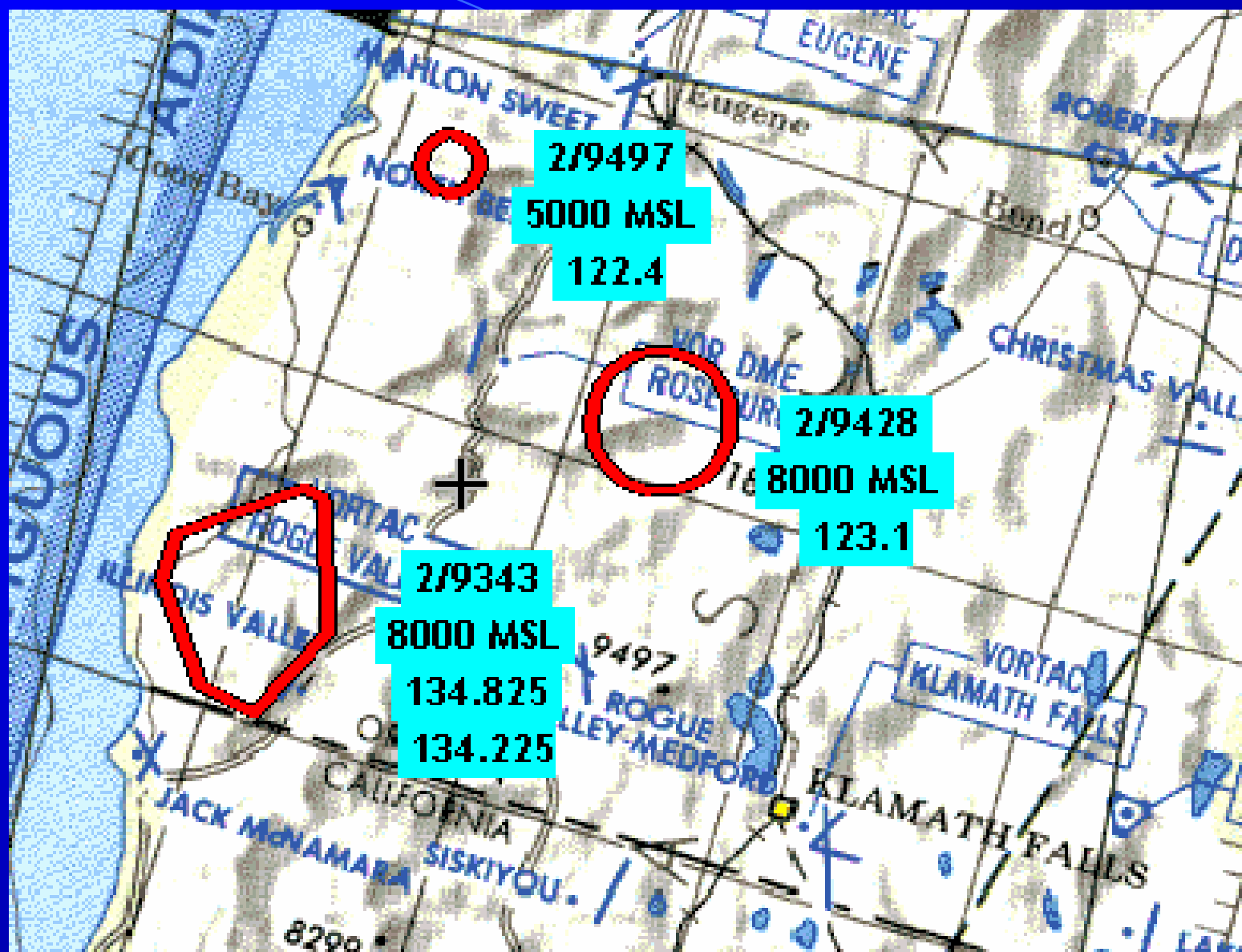




Fire-Fighting TFRs



Micro Level Fire-Fighting TFRs



Paraphrased Text Sample

- DC Area

2/1369 - FLIGHT RESTRICTIONS WASHINGTON, DC. EFFECTIVE IMMEDIATELY UNTIL FURTHER NOTICE, PURSUANT TO SPECIAL FEDERAL AVIATION REGULATION 94 (SFAR 94), ENHANCED SECURITY PROCEDURES FOR OPERATIONS AT CERTAIN AIRPORTS IN THE WASHINGTON D.C. METROPOLITAN AREA SPECIAL FLIGHT RULES AREA, AND 14 CFR SECTION 99.7, SPECIAL SECURITY INSTRUCTIONS, UNLESS SPECIFICALLY AUTHORIZED BY THE FAA IN CONSULTATION WITH THE UNITED STATES SECRET SERVICE, ALL PARTS 91, 103, 105, 125, 133, 135, 137 FLIGHT OPERATIONS ARE PROHIBITED WITHIN THE WASHINGTON D.C. METROPOLITAN AREA SPECIAL FLIGHT RULES AREA. AS DESCRIBED IN SFAR 94,AN AREA BOUNDED BY A LINE BEGINNING AT THE WASHINGTON (DCA) VOR/DME 300 DEGREE RADIAL AT 15 NM, THENCE CLOCKWISE ALONG THE DCA 15 NM ARC FROM THE SURFACE UP TO BUT NOT INCLUDING FL180. WIE UNTIL UFN

- Fire-Fighting

2/9343 - OR.. FLIGHT RESTRICTIONS GOLD BEACH, OR. EFFECTIVE IMMEDIATELY UNTIL FURTHER NOTICE. PURSUANT TO 14 CFR SECTION 91.137A(2), TEMPORARY FLIGHT RESTRICTIONS ARE IN EFFECT FROM 423900N/1235300W (OED267044) TO 423837N/1234840W (OED267041) TO 421730N/1233700W (OED233033) TO 420000N/1234730W (OED217049) TO 420116N/1240125W (OED224056) TO AT AND BELOW 8000 FT MSL TO PROVIDE A SAFE ENVIRONMENT FOR FIRE FIGHTING AIRCRAFT OPERATIONS. U.S FOREST SERVICE IS IN CHARGE OF ON SCENE EMERGENCY RESPONSE ACTIVITIES. MC MINNVILLE IS THE FAA COORDINATION FACILITY. WIE UNTIL UFN



DISCUSSION...